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Report
on the
test of a heating boiler according to DIN EN 303-5
Report C Test on the boiler performance requirements

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The test results refer exclusively to the units under test.

Test laboratory	TÜV SÜD Industrie Service GmbH Abteilung Feuerungs- und Wärmetechnik DIN-Prüfstelle
Subject of test	Heating boilers for solid fuels Type: LogWIN ... Premium Model/Size: LogWIN 500 Premium Fuel: Log wood Fuel fed: manual stoking Combustion air supply: with an induced draught fan
Customer	Windhager Zentralheizung Technik GmbH Anton-Windhager-Strasse 20 A-5201 Seekirchen
Manufacturer	Windhager Zentralheizung Technik GmbH A-5201 Seekirchen
Scope	Validation of the boiler performance requirements of DIN EN 303-5 as a part of the test on the heating boiler of a heating boiler series
Expert	Dipl.–Ing. Uwe Schlosser
Period of test	April to June 2008
Basis of test	DIN EN 303-5:1999-06, clause 4.2

Certified System SWISSTS ISO 9001

This test report is also issued in a German version. In any case of doubts the German version is binding.

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1 Summary

Customer	Windhager Zentralheizung Technik GmbH, A-5201 Seekirchen
Manufacturer	Windhager Zentralheizung Technik GmbH, A-5201 Seekirchen
Construction	Heating boiler made of steel burning log wood according to DIN EN 303-5 with an induced draught fan Combustion: gasification and combustion in combustion chamber, downwards directed flame and a secondary combustion chamber Fuel fed: manual stoking Grate design: plane grate partly out of cast or ceramic material Ash removal: manual Fittings: secondary combustion chamber consists out of ceramic material, turbulators in all heat exchanger tubes
Type	LogWIN ... Premium
Model/Size	LogWIN 500 Premium
Nominal heat output range	23,7 kW to 50,0 kW
Destination countries	AT, BE, CH, DE and IT
Boiler class	3
Maximum allowable temperature	95 °C
Max. allowable operating pressure	3 bar
Necessary flue gas draught	20 Pa
Electrical power supply	230 V, 50 Hz

The test was performed by the expert in the laboratory of Windhager Zentralheizung Technik GmbH, A-5201 Seekirchen using a test rig according to picture A.2 of DIN EN 304: 2004-01. The test rig was evaluated by the expert. The used measurement equipment was calibrated and traceable assigned to the test rig. The conditions for the test, the results and the evaluation are documented in chapter 6.

The boiler performance requirements of **boiler class 3** are fulfilled according to clause 4.2 of DIN EN 303-5: 1999-06 as well as the specific additional requirements of the above listed destination countries according to annex A of DIN EN 303–5:1999-06.

Feuerungs- und Wärmetechnik
DIN-Prüfstelle

Johannes Steiglechner

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2 Scope of test

The manufacturer orders an evaluation on the boiler performance requirements of DIN EN 303-5 of the heating boiler which is part of a heating boiler series.

3 Basis of test

DIN EN 303-5:1999-06	Heating boilers for solid fuels, hand and automatically stocked, nominal heat output of up to 300 kW, clause 4.2

4 Applied test documents

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5 Description of heating boiler

5.1	Construction	Warm water heating boiler with integrated filling and combustion chamber, gasification and primary combustion of fuel on a not cooled plane grate in filling chamber, final combustion within a second combustion chamber placed underneath of filling chamber by means of supply of secondary combustion air (downwards directed flame), heat exchanger placed behind both combustion chambers
5.2	Operation	Operation at fixed nominal heat output, operation in combination with an on site accumulator tank according to DIN EN 303–5:1999-06, modulating operation when boiler's water temperature is greater than 78 °C, shutoff when boiler's water temperature is greater than 87 °C, starting of operation when boiler's water temperature is lower than 75 °C or 65 °C according to preset
5.3	Accessories	
5.3.1	Control system	Manufacturer: Windhager Zentralheizung Technik GmbH Type: FMF.S V3.0 G unit with boiler, operation of boiler only with this control system
5.3.1.1	Boiler's water temperature sensor	Sensor Type: 502186 NTC 5K, 03/29 part of control system, sensor positioned into immersion pocket which is situated in upper, left position at rear side of boiler
5.3.1.2	Combustion chamber temperature sensor	Type: no specific designation, part of control system sensor positioned just after the exit of combustion gases out of the secondary ceramic combustion chamber

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5.3.1.3	Flue gas temperature sensor (only for indication)	Type: 006820PT1000E part of control system sensor positioned at the flue gas connector, used just for indication of flue gas temperature
5.3.1.4	O_2 sensor	Manufacturer: Robert Bosch AG, Type: LSM 11 the O_2 content is measured in flue gas, control of combustion air flaps and induced draught fan by means of control system
5.3.2	Induced draught fan	Motor-manufacturer: ATB Type: SRBFUO 09, 2-B41R, 072468-X 230 V, 0,42 A, 0,053 kW, 50 Hz, max. 2700 1/min., cosφ 0,99 Ø 17,0 cm, 8 blades, height 4,5 cm, length 6,5/3,5 cm
5.3.3	Combustion air flaps	Motor-manufacturer: Crouzet Type: 82514028, 009227, 265/03 230 V, 4 W, 50 Hz, 1 RPM, motor driven flaps each for primary and secondary combustion air
5.3.4	Thermal sequence protection device	Installed on site, supplied by user but adequate, e.g. tested according to DIN 3440 and certified, set point 95 °C, minimum flow rate 1000 l/h, sensor positioned in an immersion pocket at rear side of heating boiler underneath of the safety heat exchanger, used at testing: Manufacturer: SYR, Type 3065, DIN-Reg. no. TH797/03
5.3.5	Safety heat exchanger	Drawing no. 2-374-007413 dated 2008-02-05 (checked) (GEWA-ripped tube, fix integrated in the boiler, outer-∅ 19 mm, single layer model, straightened length 3400 mm, length of ripped part 3190 mm)
5.3.6	Ignition device	None, ignited by operator
5.3.7	Micro-switch at front cover door	Manufacturer: OMRON, Type: Z-15 GW4-B, 15A 125 / 250 / 480 VAC CE switches induced draught fan to maximum speed
5.4	Stoking of fuel	Manual, through filling chamber door

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5.5	Data plate	Windhager Zentralheizung Technik GmbH, A-5201 Seekirchen Type: LogWIN 500 Premium Number and year of manufacture: will be added Nominal heat output range: 23,7 kW to 50,0 kW Fuel: log wood Boiler class: 3 Maximum allowable operating pressure: 3 bar Maximum allowable temperature: 95 °C Water volume of boiler: 147 l Electrical supply: 230 V, 50 Hz, 0,1 kW
5.6	Constructional equality/ Special features	The heating boilers of model LogWIN 180, 250 and 300 (Size 1) are constructional equal except to the different adequate set parameters for each heat output. The heating boilers of model LogWIN 360 and 500 (Size 2) are constructional equal except to the different adequate set parameters for each heat output. The heating boilers of size 1 and size 2 are constructional equal except to the following features: - Breadth of boiler bodies (size 1 is 120 mm smaller) - Safety heat exchanger size 1: Drawing no. 2-374-007396 dated 2007-09-20 (checked) (GEWA-ripped tube, fix integrated in the boiler, outer-∅ 19 mm, single layer model, straightened length 2225 mm, length of ripped part 1995 mm) size 2: see clause 5.3.5 - Flue gas connector (130 mmØ, size 1, 150 mmØ, size 2) - Number of tubes of heat exchanger (4, size 1, 5, size 2) - Different adequate set parameters for each heat output
5.7	Boundary conditions for operation	Test report no. H-SP 1240-00/08 and H-SR 1240-00/08

The list of measurement devices used for the test is documented in the files at the test laboratory.

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6 Test of boiler performance requirements

6.1 Test conditions					
Heat transfer fluid: water		heat loss of test rig:		0,26 kW/0,26 kW	
Test no.		1 nominal power	2 part load	-	-
Type		LogWIN 500 Premium			
Date of test		2008-04-21	2008-04-22	-	-
Test duration	h	9,6	10,5	-	-
Number of combustion periods		2	1	-	-
Control system		Part of heating boiler, Type FMF-S V3.0G			
The fuel analysis was carried out by: TÜV SÜD Industrie Service GmbH					
6.2 Fuel					
Type		Log wood	Log wood	-	-
Sort		beech	beech	-	-
Size/dimension	mm	150*150*500	150*150*500	-	-
Water content	%	20,1	11,5	-	-
Ash content	kg/kg	0,004	0,004	-	-
Lower calorific value	kWh/kg	3,84	4,34	-	-
Fed amount of fuel [1]	kg	137,0	62,7	-	-
Fed amount of fuel per hour	kg/h	14,3	6,0	-	-
Ash	kg	0,5	0,3	-	-
Combustible fraction in the ash	%	20	20	-	-
Heat input	kW	55,1	25,6	-	-
6.3 Measured parameters and losses of flue gas:				-	-
Average flue gas temperature	°C	175	109		
Combustion air temperature	°C	23	22	-	-
Room temperature	°C	23	22	-	-
CO_2-content	Vol.%	15,7	14,6	-	-
CO-content	ppm	153	280	-	-
NO_X-content	ppm	128	107	-	-
C_XH_Y-content	ppm	1	2	-	-
Dust content (related to sucked f. gas v.)	mg/m^3	36	38	-	-
Draught	mbar	0,20	0,14	-	-
Combustion chamber pressure	mbar	-1,00	-0,54	-	-
Specific flue gas volume (dry)	m^3/kg	4,5	5,4	-	-
Specific steam volume	m^3/kg	0,8	0,8	-	-
Flue gas mass flow (wood 23,1 % of humidity) according to DIN EN 13384-1:2003-03	g/s	29	14	-	-
Losses due to: sensible heat of the products of combustion q_A	%	8,1	4,7	-	-
incomplete combustion q_u	%	0,1	0,1	-	-
unburned fuel in ash q_F	%	0,2	0,2	-	-
radiation, convection and conduction q_S	%	1,1	2,3	-	-
boiler efficiency indirect	%	90,5	92,7	-	-
Electric energy consumption					
Nominal/part power	W	66	51	-	-
Stand by	W	7	-	-	-

[1] Filling chamber filled with log wood according to information of manufacturer.

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6.4 Measured water parameters Test No.:			1	2	-	-
Water flow		kg/h	684	331	-	-
Water pressure		bar	1,3	1,2	-	-
Return temperature		°C	61,7	63,4	-	-
Flow temperature		°C	77,5	78,3	-	-
Inlet temperature (cooling water)		°C	15,6	17,6	-	-
Rated output including losses of test rig		kW	49,7	23,7	-	-
According to	Nominal heat output	%	99	47	-	-
	Part load	%	-	100	-	-
Boiler efficiency direct		%	90,1	91,6	-	-

6.5 Surface temperatures: Measured at test no. 1		Average values	Max. values	Limits
Cover	°C	30	36	$65+t_R$
Doors, housing, induced draught fan [2]	°C	-	64	$100+t_R$
Bottom	°C	41	45	$65+t_R$
Operating levers	°C	32	44	$35+t_R$ or $60+t_R$

6.6 Comparison 6.6.1 of values with the requirements of DIN EN 303-5:1999 for boiler class 3		Test No. 1		Test No. 2	
		achieved	required	achieved	required
Boiler efficiency	%	90,1	≥77,2	91,6	≥77,2
CO-emissions (related to 10 % O_2)	mg/m³	130	≤5000	256	≤5000
OGC-emissions (related to 10 % O_2)	mg/m³	179	---	161	---
NO_X-emissions (related to 10 % O_2)	mg/m³	2	≤150	4	≤150
Dust-emissions (related to 10 % O_2)	mg/m³	24	≤150	27	---[3]
Flue gas temperature	°C	175[4]	$\geq 160+t_R$	109[4]	$\geq 160+t_R$
Draught	mbar	0,20	≤0,34	0,14	≤0,34
Ash bin sufficient	--	Yes	---	Yes	---
Duration of tests, 2/1 combustion period	h	9,6	≥4,0	10,5	≥4,0
6.6.2 of values with the requirements for Germany and Switzerland according to annex A2 and A5 of EN 303-5:1999 as well as with 1. BImSchV (Germany) and Swiss Ordinance on Air Pollution (Switzerland)[5]					
Dust-emissions (related to 13 % O_2)	mg/m³	18	≤150 or ≤60	20	≤150 or ≤60
NOx-emissions (related to 13 % O_2)	mg/m³	130	---	117	---
OGC-emissions (related to 13 % O_2)	mg/m³	1	---	3	---
CO-emissions (related to 13 % O_2)	mg/m³	95	≤4000 or ≤800	186	≤4000 or ≤800
6.6.3 of values with the requirements for Austria according to annex A.1 of DIN EN 303-5:1999-06 and with the Austrian law paragraph 15 a "Vereinbarung über Schutzmaßnahmen betreffend Kleinfeuerungen" and "Vereinbarung über die Einsparung von Energie".					
Boiler efficiency	%	90,1	≥78,4	91,6	≥78,4
CO-emissions	mg/MJ	62	≤1100	120	≤1100
NO_X-emissions	mg/MJ	86	≤150	76	-[6]
OGC-emissions	mg/MJ	1	≤80	2	≤80
Dust-emissions	mg/MJ	12	≤60	13	-[6]

[2] Doors and cleaning ports are placed underneath of the housing or front door and so not directly accessible
[3] The requirements are fulfilled according to clause 4.2.6 of DIN EN 303-5:1999-06
[4] Additional manufacturer's information are given in the installation and user manual according to clause 4.2.2 of DIN EN 303-5
[5] The limiting values are respected according to LRV, clause 4, issue 01.09.2007
[6] Test not necessary according to Article 8 of the Austrian law 15a B-VG

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7 Expertise

The heating boiler of manufacturer	Windhager Zentralheizung Technik GmbH, Anton-Windhager-Strasse 20, A-5201 Seekirchen
type	LogWIN ... Premium
model/size	LogWIN 500 Premium
as presented for the testing	heating boiler made of steel burning log wood according to DIN EN 303-5

was tested according to the boiler performance requirements of clause 4.2 of DIN EN 305-5:1999-06 by the test laboratory TÜV SÜD Industrie Service GmbH.

The boiler performance requirements of **boiler class 3** of DIN EN 303-5:1999-06, clause 4.2 are fulfilled as well as the additional requirements for the destination countries AT, DE and CH of annex A, clause A.1, A.2 and A.5 of DIN EN 303-5:1999-06, operating the heating boiler in combination with an accumulator tank calculated according to DIN EN 303-5:1999-06.

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The expert

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